

WE CLAIM:

1. A roll-up curtain comprising:

a first curtain section including a first fixed upper rod attached to a support structure and a second lower rod;

5 a second curtain section including a third fixed upper rod attached to the support structure and a fourth lower rod, wherein said second curtain section is aligned with and laterally spaced from said first curtain section;

a rotary drive disposed intermediate said first and second curtain sections and coupled to said second and fourth lower rods for rotationally displacing said second and fourth lower rods in a first direction for rolling up said first curtain section on said second lower rod and
10 said second curtain section on said fourth lower rod in opening said first and second curtain sections, and for rotationally displacing said second and fourth lower rods in a second opposed direction for unrolling said first curtain section from said second lower rod and said second curtain section from said fourth lower rod in closing said first and second curtain sections; and

a vertical guide engaging said rotary drive for directing said rotary drive in
15 vertical travel upward during rolling up of said curtain sections and downward during unrolling of said curtain sections and maintaining said rotary drive a fixed distance from and in a fixed orientation relative to said first and second curtain sections during rolling up and unrolling of said curtain sections.

2. The roll-up curtain of claim 1 wherein said rotary drive includes an electric motor coupled to adjacent ends of said second and fourth lower rods.

3. The roll-up curtain of claim 2 wherein said vertical guide includes a generally

vertical panel disposed adjacent said rotary drive and a carriage member coupled to and movable with said rotary drive and engaging said vertical panel during vertical travel of said rotary drive.

4. The roll-up curtain of claim 3 wherein said vertical panel is generally flat and includes first and second opposed lateral edges each including a respective retaining flange, wherein said retaining flanges engage, prevent twisting and limit travel of said carriage member in a generally vertical direction.

5. The roll-up curtain of claim 4 wherein said retaining flanges are disposed along the length of said panel and are generally L-shaped in cross section and extend inwardly toward a flat inner portion of said panel.

6. The roll-up curtain of claim 5 wherein said carriage member is generally flat and elongated and is aligned with the flat inner portion of said panel.

7. The roll-up curtain of claim 6 wherein said carriage member includes first and second rollers each disposed on respective opposed ends of said carriage member, and wherein each of said rollers is disposed in and engaged by a respective retaining flange of said panel.

8. The roll-up curtain of claim 7 further comprising at least one elongated, linear shaft for rotationally mounting said rollers to said carriage member.

9. The roll-up curtain of claim 8 wherein the flat inner portion of said panel and said carriage member are aligned generally parallel with said second and fourth lower rods.

10. The roll-up curtain of claim 7 further comprising a third roller attached to said carriage member intermediate the first and second ends thereof and engaging the flat inner portion of said panel for facilitating displacement of the rotary drive on said panel.

11. The roll-up curtain of claim 10 wherein each of said rods is comprised of tubular

steel.

12. The roll-up curtain of claim 1 further comprising plural connecting pins inserted through each of the lower portions of said first and second curtain sections and into said second and fourth lower rods.

13. The roll-up curtain of claim 12 wherein each of said connecting pins is a screw or nail.

14. The roll-up curtain of claim 1 wherein said second and fourth lower rods are disposed in lower edge portions of said first and second curtain sections, respectively.

15. The roll-up curtain of claim 14 further comprising a protective sleeve attached to the lower edge of said second curtain section.

16. The roll-up curtain of claim 15 wherein said protective sleeve is comprised of plastic or metal.

17. The roll-up curtain of claim 15 wherein said protective sleeve is comprised of PVC.

18. The roll-up curtain of claim 1 wherein said second curtain section includes an upper portion and a lower portion and wherein said fourth lower rod is disposed on an intermediate portion of said second curtain section between said upper and lower portions, and wherein said upper and power portions of said second curtain section are simultaneously rolled up on or unrolled from said fourth lower rod as said second curtain section is opened or closed.

19. The roll-up curtain of claim 18 further comprising a fifth rod disposed on a lower edge of said second curtain section.

20. The roll-up curtain of claim 19 wherein each of said first and second curtain

sections includes plural spaced hems, and wherein each of said rods is disposed within a respective one of said hems of a curtain section.

21. The roll-up curtain of claim 20 wherein each of said rods and hems extends the length of the curtain section within which the rod and hem combination is disposed.

22. The roll-up curtain of claim 21 further comprising plural connecting pins inserted through each of the lower portions of said first and second curtain sections and into said second and fourth lower rods.

23. The roll-up curtain of claim 22 wherein each of said connecting pins is a screw or nail.

24. The roll-up curtain of claim 1 wherein said rotary drive includes a first upper rotary drive coupled to said second lower rod and a second lower rotary drive coupled to said fourth lower rod, and wherein each of said upper and lower rotary drives engages said vertical guide.

25. The roll-up curtain of claim 24 wherein said first upper and second lower rotary drives are further coupled to third and fourth curtain sections, respectively, for rolling up and unrolling said third and fourth curtain sections simultaneously with said first and second curtain sections, and wherein said first and third curtain sections are disposed on opposed sides of said first upper rotary drive and said second and fourth curtain sections are disposed on opposed sides of said second lower rotary drive.

26. The roll-up curtain of claim 25 wherein said first and second rotary drives respectively include first and second electric motors.

27. The roll-up curtain of claim 26 wherein said first and second rotary drives

further respectively include first and second gearboxes coupled to said first and second electric motors, respectively.

28. The roll-up curtain of claim 27 further comprising first and second double reduction drive assemblies respectively coupling said first and second gearboxes to said second and fourth lower rods.

29. The roll-up curtain of claim 28 wherein each of said first and second double reduction drive assemblies includes a respective drive sprocket coupled to a gearbox, a respective driven sprocket coupled to a lower rod, and a respectively roller chain connecting paired drive and driven sprockets.

30. The roll-up curtain of claim 1 further comprising a first pair of detectors for sensing a full-up position and a full-down position of said first curtain section and a second pair of detectors for sensing a full-up position and a full-down position of said second curtain section for limiting vertical displacement of said first and second curtain sections.

31. The roll-up curtain of claim 30 wherein said first pair of detectors includes first upper and lower limit switches engaged by said second lower rod and said second pair of detectors includes second upper and lower limit switches engaged by said fourth lower rod.

32. A roll-up curtain comprising:

a first curtain section including a first fixed upper rod and a second lower rod;

a second curtain section in vertical alignment with said first curtain section and including a third fixed upper rod and a fourth lower rod, wherein said second curtain section is disposed below said first curtain section;

first and second rotary drives respectively coupled to a first end of said second

lower rod and a first end of said fourth lower rod, wherein said first and second curtain sections are rolled up on said second and fourth lower rods, respectively, when said rods are rotated in a first direction by said rotary drives and said rods move upward, and wherein said first and second
10 curtain sections are unrolled from said lower rods when said rods are rotated in a second, opposed direction by said rotary drives and said rods move downward;

first and second carriages respectively coupled to said first and second rotary drives for moving upward and downward with said rotary drive; and

a fixed, generally vertical guide engaging said first and second carriages in a
15 movable manner for limiting movement of said first and second rotary drives to vertical direction and preventing a torque exerted by said curtain sections on said lower rods from changing the position or orientation of said rotary drives.

33. The roll-up curtain of claim 32 wherein said second curtain section includes an upper portion and a lower portion, and wherein said fourth lower rod is disposed intermediate
20 said upper and lower portions.

34. The roll-up curtain of claim 33 further comprising a fifth rod disposed on a lower edge of said lower portion of said second curtain section.

35. The roll-up curtain of claim 32 wherein each of said first and second curtain sections includes plural spaced hems, and wherein each of said rods is disposed within a respective one of said hems of a curtain section.

36. The roll-up curtain of claim 35 wherein each of said rods and hems extends the length of the curtain section within which the rod and hem combination is disposed.

37. The roll-up curtain of claim 36 further comprising plural connecting pins inserted

through each of the lower portions of said first and second curtain sections and into said second and fourth lower rods.

38. The roll-up curtain of claim 37 wherein each of said connecting pins is a screw or nail.

39. The roll-up curtain of claim 32 wherein said first and second rotary drives respectively include first and second electric motors.

40. The roll-up curtain of claim 39 wherein said first and second rotary drives further include first and second gearboxes respectively coupled to said first and second electric motors.

41. The roll-up curtain of claim 40 further comprising first and second double reduction drive assemblies respectively coupling said first and second gearboxes to said second and fourth lower rods.

42. The roll-up curtain of claim 41 wherein each of said first and second double reduction drive assemblies includes a respective drive sprocket coupled to a gearbox, a respective driven sprocket coupled to a lower rod, and a respective roller chain connecting paired drive and driven sprockets.

43. The roll-up curtain of claim 32 wherein said vertical guide includes a generally vertical panel disposed adjacent said rotary drives and first and second carriage members coupled to and movable with said first and second rotary drives, respectively, and engaging said vertical panel during vertical travel of said rotary drives.

44. The roll-up curtain of claim 43 wherein said vertical panel is generally flat and includes first and second opposed lateral edges each including a respective retaining flange,

wherein said retaining flanges engage, prevent twisting and limit travel of said carriage members in a generally vertical direction.

45. The roll-up curtain of claim 44 wherein said retaining flanges are disposed along the length of said panel and are generally L-shaped in cross section and extend inwardly toward a flat inner portion of said panel.

46. The roll-up curtain of claim 45 wherein said carriage member is generally flat and elongated and is aligned with the flat inner portion of said panel.

47. The roll-up curtain of claim 46 wherein said carriage member includes first and second rollers each disposed on respective opposed ends of said carriage member, and wherein each of said rollers is disposed in and engaged by a respective retaining flange of said panel.

48. The roll-up curtain of claim 47 further comprising at least one elongated, linear shaft for rotationally mounting said rollers to said carriage member.

49. The roll-up curtain of claim 48 wherein the flat inner portion of said panel and said carriage member are aligned generally parallel with said second and fourth lower rods.

50. The roll-up curtain of claim 47 further comprising a third and fourth rollers respectively attached to said first and second carriage members intermediate the first and second ends thereof and engaging the flat inner portion of said panel for facilitating displacement of the rotary drives on said panel.

51. The roll-up curtain of claim 1 further comprising a first pair of detectors for sensing a full-up position and a full-down position of said first curtain section and a second pair of detectors for sensing a full-up position and a full-down position of said second curtain section for limiting vertical displacement of said first and second curtain sections.

52. The roll-up curtain of claim 51 wherein said first pair of detectors includes first upper and lower limit switches engaged by said second lower rod and said second pair of detectors includes second upper and lower limit switches engaged by said fourth lower rod.

53. The roll-up curtain of claim 51 wherein said second curtain section includes an upper portion and a lower portion and a fifth rod disposed on a lower edge of said lower portion, wherein said fourth lower rod is disposed intermediate said upper and lower portions and wherein said first pair of detectors includes first upper and lower limit switches engaged by said
5 second lower rod and said second pair of detectors includes second upper and lower limit switches respectively engaged by said fourth lower rod and by said fifth rod.